



IB MYP Year 5

Year 10 Extended Mathematics

Assessment #8



PATTERNS IN PROBABILITY

Unit Question: How do we remember what we have learned? Name: Jasmine T
Area of Interaction: ATL Teachers: Ms. Li, Mr. So, and Mr. Wong
Date: May 31, 2013 Time Allowed: Single Lesson
Concept Statement: You will always find previous knowledge useful in future situations.
The objective of this task is to find a pattern in probability in a table tennis game using knowledge from both this year and last year.

PREPARATION:

- ◆ From year 9, revise what you have learned about **probability**.
- ◆ From year 10, revise what you have learned about **sequences** and **series**.

INSTRUCTIONS:

- ◆ Show all **steps** and proper **units** on the **lined paper** provided.
- ◆ Submit **your own work**. Any copying or other cheating, will automatically receive a 0.
- ◆ You are allowed to use non-electronic **dictionary**.
- ◆ **Calculators** are allowed.

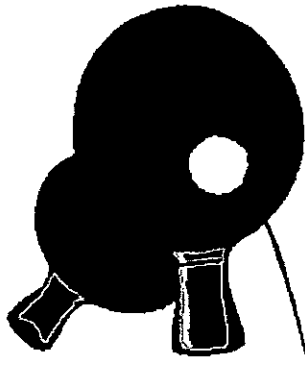
ASSESSMENT:

- ◆ Read **all the questions** first, then the **criteria descriptors** and **task-specific clarifications** carefully before you start your work. This will give you a clear understanding of what is required and what a high quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest levels in this task.
- ◆ This task assesses Criterion B.

CRITERION B: INVESTIGATING PATTERNS

Achievement level	Task Specific Rubric	IBO Published Descriptor	Student's Self-Evaluation
0	The student does not reach a standard described by any of the descriptors given below.	The student does not reach a standard described by any of the descriptors given below.	3 (0-8)
1-2 Do Maths	You are able to answer the early questions, and order your answers in a way that reveals patterns.	The student applies, with some guidance, mathematical problem-solving techniques to recognize simple patterns.	
3-4 General Rule	You develop appropriate systematic methods in order to answer the questions. The results you get help you to suggest a mathematical rule using a, b and N.	The student applies mathematical problem-solving techniques to recognize patterns, and suggests relationships or general rules.	Teacher's Final Grade
5-6 Test it	You continue with the questions, and use questions 6 and 7 as a check on your findings.	The student selects and applies mathematical problem-solving techniques to recognize patterns, describes them as relationships or general rules, and draws conclusions consistent with findings.	
7-8 Prove it	You are able to justify or prove your answer to question 6.	The student selects and applies mathematical problem-solving techniques to recognize patterns, describes them as relationships or general rules, draws the correct conclusions consistent with the correct findings, and provides justifications or proofs.	

PATTERNS IN PROBABILITY



I play table tennis against a friend. The probability I win a point is **a** and the probability she wins a point is **b**. These probabilities stay constant throughout the game.

(**Important Note:** $a \neq b$ While two table tennis players can have the same skill level, in general one player is better. This will be important in question 7.)

A game is won only when a player wins two consecutive points.

So, for example, I might win a game where the point rallies go: WLWLWLWW (that is, I win the game because I won the final 2 points).

In the following, simplify your answers wherever possible.

1. Write a simple relationship between **a** and **b**.
2. What is the probability I win the first two points (and so win the game)?
3. What is the probability the game lasts for 3 points and I win?
4. What is the probability the game lasts for 4 points and I win?

(You may like to repeat question 4 for when the game lasts for 5 points, or 6, or 7 and so on.)

5. Describe mathematically any patterns you find in these probabilities.
6. What is the probability, in terms of **a** and **b**, that the game lasts for **N** points and I win?
7. If $a = 0.6$, show that the probability I win a game in 5 points or less is approximately 0.625.
8. Write a **proof** or **justification** of your answer to question 6.

~ End of Assessment ~

1. $\frac{a}{\text{points}} = \frac{b}{\text{points}}$

2. $\frac{2}{2} = 100\%$

3. $\frac{1}{1} = 100\%$

3. $\frac{2}{3} = 66.67\%$

4. $\frac{2}{4} = \frac{1}{2} = 50\%$ $\frac{2}{5} = 40\%$ $\frac{2}{6} = \frac{1}{3} = 33.3\%$ $\frac{2}{8} = 25\%$

5. We can see in the pattern that the longer point the game last for the lower possibilities that "1" will win in the final 2 points.

6. $\frac{a}{N} = \frac{b}{N}$ "1" win $\frac{a}{N}$

7. $\frac{0.6}{1} = \frac{b}{1.6} = 0.6$

$a = \frac{0.6}{1} = 0.6 = 60\%$

8. Let a be 0.8 let b be 0.5

Let N be 1

$\frac{0.8}{1} = \frac{b}{1}$

* The result shows that the

$\frac{0.8}{1} = \frac{0.5}{1}$

$a = \frac{0.8}{1} = 0.8$ $b = \frac{0.5}{1} = 0.5$

$\therefore a = 0.8$ $P(a) = 80\%$ $b = 0.5$ $P(b) = 50\%$